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PATENT
0630-1167P

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant: K.A. Schouhamer IMMINK Conf.: 9133
Appl. No.: 09/707,947 Group: 2819
Filed: November 8, 2000 Examiner: UNASSIGNED

For: METHOD AND APPARATUS FOR CODING
INFORMATION, METHOD AND APPARTUS FOR
DECODING INFORMATION, METHOD OF
FABRICATING A RECORDING MEDIUM, THE
RECORDING MEDIUM AND MODULATED SIGNAL

LETTER

Assistant Commissioner for Patents
Washington, DC 20231

June 7, 2001

Sir:

Under the provisions of 35 U.S.C. § 119 and 37 C.F.R. § 1.55(a), the applicant(s) hereby claim(s) the right of priority based on the following application(s):

<u>Country</u>	<u>Application No.</u>	<u>Filed</u>
Europe	99203739.0	November 11, 1999

A certified copy of the above-noted application(s) is(are) attached hereto.

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Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By 
Gary B. Yacura, #35,416

GDY:lmh
0630-1167P

Attachment

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Patentanmeldung Nr. Patent application No. Demande de brevet n°

99203739.0

Der Präsident des Europäischen Patentamts;
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For the President of the European Patent Office

Le Président de l'Office européen des brevets
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**Blatt 2 der Bescheinigung
Sheet 2 of the certificate
Page 2 de l'attestation**

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Anmelder:
Applicant(s):
Demandeur(s):
Schouhamer Immink, K. A.
5664 AN Geldrop
NETHERLANDS

Bezeichnung der Erfindung:
Title of the invention:
Titre de l'invention:

**Method of converting a series of m-bit information words to a modulated signal and vice versa,
coding device as well as decoding device**

In Anspruch genommene Priorität(en) / Priority(ies) claimed / Priorité(s) revendiquée(s)

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09. 11. 1999

Method of converting a series of m-bit information words to a modulated signal and *vice versa*, coding device as well as decoding device.

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BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a method of encoding and decoding a series of m-bit information words into a series of n-bit code words according to conversion rules so that the series of code words satisfies a predetermined criterion, and in particular, to a so-called (d,k)-constraint, where said encoded sequence of n-bit code words complies with the constraint that each "1" of the encoded sequence is followed by at least d "0"s and at most k "0"s, where d and k are positive integers, and where k exceeds d, and the series of said n-bit code words are converted into a modulated signal.

The invention further relates to an apparatus for performing the method as claimed, this device comprising an m-to-n converter for converting the m-bit information words into n-bit code words, and means for converting the series of n-bit code words into a modulated signal.

2. Description Relative to the Prior Art

Run length limited codes, generically designated as (d, k) codes, have been widely and successfully applied in modern magnetic and optical recording

systems. Such codes, and means for implementing said codes are described by K. A. Schouhamer Immink in the book entitled "Coding Techniques for Digital Recorders" (ISBN 0-13-140047-9). Run length limited codes are extensions of earlier non return to zero recording codes, where binary recorded "zeros" are represented by no (magnetic flux) change in the recording medium, while binary "ones" are represented by transitions from one direction of recorded flux to the opposite direction. In a (d, k) code, the above recording rules are maintained with the additional constraints that at least d "zeros" are recorded between successive data "ones", and no more than k "zeros" are recorded between successive data "ones". The first constraint arises to obviate intersymbol interference occurring due to pulse crowding of the reproduced transitions when a series of "ones" are contiguously recorded. The second constraint arises in recovering a clock from the reproduced data by "locking" a phase locked loop to the reproduced transitions. If there is too long an unbroken string of contiguous "zeros" with no interspersed "one"s, the clock regenerating phase-locked-loop will fall out of synchronism. In, for example, a (1,7) code there is at least one "zero" between recorded "ones", and there are no more than seven recorded contiguous "zeros" between recorded "ones". The series of encoded bits is converted, *via* a modulo-2 integration operation, to a corresponding modulated signal formed by bit cells having a high or low signal value, a "one" bit being represented in the modulated signal by a change from a high to a low signal value or *vice versa*. A "zero" bit is represented by the lack of change of the modulated signal.

The "rate", i.e., the quotient of the number of bits in the information word and the code word, m/n , of the code is a parameter, which is a measure of its efficiency. The theoretical maximum rate of a code, given values of d and k , is called the Shannon capacity. FIGURE 1 tabulates the Shannon capacity

5 $C(d,k)$ for $d=1$ versus k . We may observe that for a $(1,7)$ code, the Shannon capacity, $C(1,7)$, has a value of 0.67929. This means that a code, generating sequences that comply with $d=1$, and $k=7$, cannot have a rate larger than 0.67929. The implementation of practical codes requires that the rate be a rational fraction, and the above $(1,7)$ code has a rate $2/3$. This rate, $2/3$, is
10 slightly less than the Shannon capacity, 0.67929, and the code is therefore a highly efficient one. To achieve the $2/3$ rate, 2 unconstrained data bits are mapped into 3 constrained encoded bits.

Rate $2/3$, $(1,7)$ codes and means for implementing associated encoders and
15 decoders are known in the art. U.S. Patent No. 4,413,251 entitled "Method and Apparatus for Generating A Noiseless Sliding Block Code for a $(1,7)$ Channel with Rate $2/3$ ", issued in the names of Adler *et al.*, discloses an encoder which is a finite-state machine having 5 internal states. U.S. Patent No. 4,488,142 entitled "Apparatus for Encoding Unconstrained Data onto a
20 $(1,7)$ Format with Rate $2/3$ ", issued in the name of Franaszek discloses an encoder having 8 internal states.

Information recording has a constant need for enhancing the information density on the record carrier.

SUMMARY OF THE INVENTION

A possible solution to this is an increase of the rate of the code. It is an object of the invention to provide means for reducing the number of bit cells per
5 information word, and in particular, to an encoding and decoding apparatus that maps 9 unconstrained bits into 13 constrained bits. The code according to the invention is very efficient as its rate, $9/13=0.69231$, is only 0.2% below the Shannon capacity, $C(1, \infty)$. The code offers a rate which is 3.8% higher than that of the rate $2/3$, $(1,7)$ code. According to a first aspect of the invention this
10 object is achieved with a method as defined in the opening paragraph, characterized in that the sets of code words pertaining to the coding states do not have code words in common.

When the information words are converted into code words, a code word
15 belonging to a set of code words depending on the coding state is assigned to the information word to be converted. The r sets of code words belonging to the coding states $S1, \dots, Sr$ will henceforth be referenced $V1, \dots, Vr$, respectively. The code words are distributed over one group of a first type and one group of a second type. The set of r coding states is divided into a subset
20 of a first type of coding states and a subset of a second type of coding states. The code words of the first type are allowed to enter any of the r encoder states, while code words of the second type are allowed to enter the subset of q first type of encoder states, where q is less than r . In other words, code words of the first type can be followed by any code word, while code words of

the second type can only be followed by code words that are associated with coding states of the first type.

In the method and coding device according to the invention, the combination
5 of the same code word with code words from disjunct sets of code words establishes multiple unique bit combinations, so that more than one information word can be uniquely represented by the same code word in combination with the successive code word. A code word is followed by a code word of which it is always possible to establish unambiguously to what
10 set this next code word belongs. It is then possible with the code words from each of the disjunct sets to establish a sufficient number of unique bit combinations to represent all the information words. Code words of the first type may be followed by code words from any of the r encoder states, and can thus be allocated r times to different information words. Code words of the
15 second type can be followed by code words of a subset of q states and can thus be allocated q times in the same encoding set. Said measures provide a possibility of establishing a large number of unique bit combinations with code words having a relatively small number of bits per code word.

20 An embodiment for a decoding device of the type described above by which this is realized is characterized in that the converting unit is arranged for converting a code word to an information word also in dependence of the upcoming code word.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be further explained with reference to the following drawings in which:

5

Figure 1 tabulates the Shannon capacity $C(1,k)$ versus k ;

Figure 2 lists the allocation of subgroups of code words to states;

10 Figure 3 shows an embodiment of the invention;

Figures 4A-H show tables in which the relationship between the information words and code words is established.

15

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the preferred embodiment, a series of 9-bit information words are translated
20 into 13-bit code words. The series of code words obtained under the rules of translation satisfy the $d=1$ constraint. The preferred embodiment of the code has $r=5$ states, wherein the set of $r=5$ states is divided into two subsets of a first and second type of size 3 and 2, respectively. There is a requirement with respect to the code words of the first and second type that within the code
25 words the $(d=1)$ -constraint be satisfied. Code words of the first type end with

a '0', while code words of the second type end with a '1'. The group code words of the first type is divided into two subgroups, denoted by E00 and E10. The code words in subgroup E00 start and end with a '0', while code words in subgroup E10 start with a '1' and end with a '0'. In a similar fashion the group

5 of code words of the second type is divided into subgroups E11 and E01, where code words in subgroup E11 end and start with a '1', and code words in subgroup E01 start with a '0' and end with a '1'. In order to reduce the k-constraint, five code words, namely, '000000000000', '0000000000001', '1000000000000', '0100000000000', and '0000000000010' are barred from

10 the encoding tables. An enumeration of code words shows there are 230 code words in subgroup E00, 143 code words in subgroups E10 and E01, and 89 code words in subgroup E11. Code words that end with a '0', i.e. code words in subgroups E10 and E00, are allowed to enter any of the $r=5$ states, while code words that end with a '1' i.e., code words in subgroups E01 and E11, can

15 only enter the 3 states of the first type. All code words that leave states of the first type start with a '0'. The available code words in the various subgroups are distributed over the various states of the first and second type. FIG. 2 shows how, in the preferred embodiment, the code words in the various subgroups are allocated to the various states. For example, from FIG. 2, we

20 observe that the subgroup E00 of size 230 has 76 code words in States 1, 2, and 3 plus 1 code word in States 4 and 5.

It is essential that the sets of code words from which a selection is to be made do not have code words in common. As a result, it is possible to assign the

25 same code word from a set of code words to different information words. In

particular code words in subgroups E10 and E00 can be assigned 5 times to different information words, while code words in subgroups E11 and E01 can be assigned 3 times to different information words. For example, the total number of information words that can be assigned to the code words in State 1 is $5 \times 76 + 3 \times 44 = 512$. Similar arguments hold for the other states. It can be verified that from any of the $r=5$ encoders states there at least 512 information words that can be assigned to code words, which is enough to accommodate 9-bit information words. In the manner described above any random series of 9-bit information words can be uniquely converted to a series of code words

FIG. 3 shows an embodiment for an encoding device according to the invention. The coding device is arranged for converting the m -bit information words to the n -bit code words, where the number of different coding states can be represented by s bits. In the case $r=5$, s equals 3. The coding device comprises a converter 50 for converting $(m+s)$ binary input signals to $(n+s)$ binary output signals. From the inputs of the converter 50, m inputs are connected to a bus 51 for receiving m -bit information words. From the outputs of the converter 50, n outputs are connected to a bus 52 for delivering n -bit code words. Furthermore, s inputs are connected to an s -bit bus 53 for receiving a state word that indicates the instantaneous coding state. The state word is delivered by a buffer memory 54 comprising, for example, s flip-flops. The buffer memory 54 has s inputs connected to a bus 55 for receiving a state word to be loaded in the buffer memory 54. For delivering the state words to be loaded in the buffer memory 54, s outputs of the converter 50 are used. Instead of comprising a ROM memory, the converter 50 may also comprise a

combinatorial logical circuit formed by gate circuits. Bus 52 is connected to the parallel inputs of a parallel-to-serial converter 56, which converts the code words received over bus 52 to a serial bit string to be supplied over a signal line 57 to a modulator circuit 58 which converts the bit string to the modulated
5 signal to be delivered over line 60. The modulator circuit 58 may be one of a customary type, for example, a modula-2 integrator. For the purpose of synchronization of the operations to be performed, the coding device shown in FIG. 3 comprises a clock generating circuit (not shown) of a customary type for generating clock signals for controlling the parallel/serial converter 58 and
10 for controlling the loading of the buffer memory 54.

FIG. 4A-H show the assignment of the 9-bit data words to the 13-bit codewords plus the new state as a function of the present state.

15 The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

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Claims

- 5 1. A method of encoding/decoding a sequence of binary data bits into a sequence of binary channel bits, wherein consecutive and sequential blocks of m data bits, where m an integer, are coded into sequential n -bit code words, where n an integer exceeding m , in accordance with a translation table, wherein the code words satisfy a dk -constraint such that
- 10 consecutive "1"s are separated by at least d and at most k "0"s, characterised in that the code words are distributed over one group of a first type and one group of a second type, wherein the set of coding states is distributed over one subset of the first type and one subset of the second type, wherein the code words of the first type are allowed to enter
- 15 encoder states of the first and second type, while code words of the second type are prohibited to enter states of the second type, while the sets of code words associated with the different coding states are disjunct.
2. A method of encoding a binary digital signal according to Claim 1, wherein
- 20 $d=1$ and the number of states equals 5 or 13.
3. A method of encoding a binary digital signal according to Claims 1 and 2, wherein $m=9$ and $n=13$.

4. A method of encoding a binary digital signal according to Claims 1 and 2,
wherein $m=11$ and $n=16$.
5. A method of encoding a binary digital signal according to Claims 1 and 2,
5 wherein $m=13$ and $n=19$.
6. A method of encoding a binary digital signal according to Claims 1 and 2,
wherein $m=15$ and $n=22$.
- 10 7. A coding device, comprising an m-to-n bit converter for converting m-bit
information words to n-bit code words, means for converting the n-bit code
words to a modulated signal, and state establishing means for establishing
a coding state on the delivery of a code word by the converter,
characterised in that the code words are distributed over one group of a
15 first type and one group of a second type, wherein the set of coding states
is distributed over one subset of a first type and one subset of a second
type, wherein the code words of the first type are allowed to enter encoder
states of the first and second type, while code words of the second type
are prohibited to enter states of type two, while the sets of code words
20 associated with the different coding states are disjunct.
8. Device as claimed in Claim 7 characterized in that d is equal to 1 and the
number of states equals 5 or 13.

9. Device as claimed in Claim 8 characterized in that $m=9$ and $n=13$, or $m=11$ and $n=16$, or $m=13$ and $n=19$, or $m=15$ and $n=22$.

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Abstract

A series of information words is converted into a modulated signal. For each
5 m-bit information word from the series, an n-bit code word is delivered. The
delivered code words are converted into the modulated signal. An m-bit
information word is translated into a code word using a table comprising sets
of code words that depend on the coding state established. The code words
are distributed over one group of a first type and one group of a second type.
10 The set of coding states is divided into one subset of a first type and one
subset of a second type. The sets of code words associated with the different
coding states are disjunct (=sets without common code words). The code
words of the first type are allowed to enter encoder states of the first type and
second type, while code words of the second type are prohibited to enter
15 states of the second type. In this coding method the number of unique
information words that can be assigned to code words is enlarged. The
modulated signal may be reconverted to information words by first converting
the modulated signal to a series of code words and then assigning an
information word to each of the code words in dependence of the code word
20 to be converted plus the upcoming code word in the series.

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Figure 1

K	$C(1, k)$
7	0.67929
8	0.68525
9	0.68879
Inf	0.69424

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Figure 2

15

subgroup	State 1	State 2	State 3	State 4	State 5
E00	76	76	76	1	1
E01	44	44	44	5	6
E10	0	0	0	72	71
E11	0	0	0	44	45

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Figure 3

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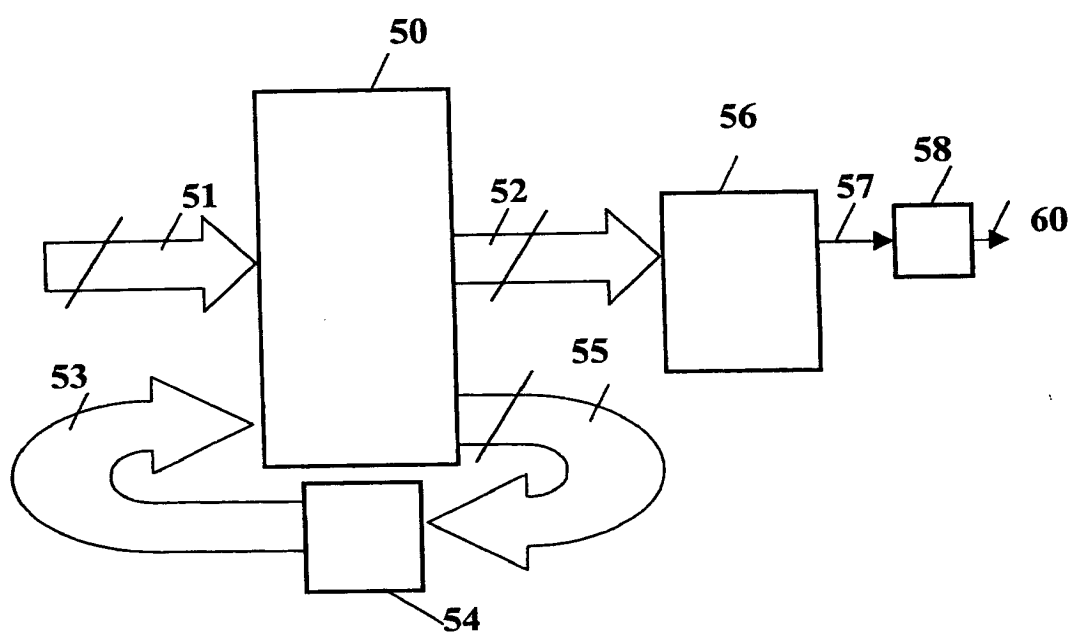


Figure 4A

		State 1		State 2		State 3		State 4		State 5		
	Data bits	Channel bits	state	Channel bits	state	Channel bits	state	Channel bits	state	Channel bits	state	
5	0	000000000	000000000100	1	0001010000100	1	0100000101000	1	0101010101000	1	0101010101010	1
	1	000000001	000000000100	2	0001010000100	2	0100000101000	2	0101010101000	2	0101010101010	2
	2	000000010	000000000100	3	0001010000100	3	0100000101000	3	0101010101000	3	0101010101010	3
	3	000000011	000000000100	4	0001010000100	4	0100000101000	4	0101010101000	4	0101010101010	4
10	4	000000100	000000000100	5	0001010000100	5	0100000101000	5	0101010101000	5	0101010101010	5
	5	000000101	0000000001000	1	0001010001000	1	0100000101010	1	0101001001001	1	0101010001001	1
	6	000000110	0000000001000	2	0001010001000	2	0100000101010	2	0101001001001	2	0101010001001	2
	7	000000111	0000000001000	3	0001010001000	3	0100000101010	3	0101001001001	3	0101010001001	3
	8	000001000	0000000001000	4	0001010001000	4	0100000101010	4	0101001001001	4	0101010001001	4
15	9	000001001	0000000001000	5	0001010001000	5	0100000101010	5	0101001001001	5	0101010001001	5
	10	000001010	0000000001010	1	0001010001010	1	0100000100000	1	0101001001001	1	0101010001001	1
	11	000001011	0000000001000	2	0001010001010	2	0100000100000	2	0101001001010	2	0101010001010	2
	12	000001100	0000000001010	3	0001010001010	3	0100000100000	3	0101001001010	3	0101010001010	3
	13	000001101	0000000001010	4	0001010001010	4	0100000100000	4	0101001001010	4	0101010001010	4
20	14	000001110	0000000001010	5	0001010001010	5	0100000100000	5	0101010000001	1	0101010100001	1
	15	000001111	0000000001000	1	0001010001000	1	0100000100001	1	0101010000001	2	0101010100001	2
	16	000010000	0000000001000	2	0001010001000	2	0100000100001	2	0101010000001	3	0101010100001	3
	17	000010001	0000000001000	3	0001010001000	3	0100000100001	3	0101010000101	1	0101010100010	1
	18	000010010	0000000001000	4	0001010001000	4	0100000100001	4	0101010000101	2	0101010100010	2
25	19	000010011	0000000001000	5	0001010001000	5	0100000100001	5	0101010000101	3	0101010100010	3
	20	000010100	0000000001010	1	0001010001010	1	0100000100010	1	1000000000010	1	0101010101001	1
	21	000010101	0000000001010	2	0001010001010	2	0100000100010	2	1000000000010	2	0101010101001	2
	22	000010110	0000000001010	3	0001010001010	3	0100000100010	3	1000000000010	3	0101010101001	3
	23	000010111	0000000001010	4	0001010001010	4	0100000100010	4	1000000000010	4	1001001010000	1
30	24	000011000	0000000001010	5	0001010001010	5	0100000100010	5	1000000000010	5	1001001010000	2
	25	000011001	0000000001010	1	0001010001010	1	0100000100100	1	1000000000100	1	1001001010000	3
	26	000011010	0000000001010	2	0001010001010	2	0100000100100	2	1000000000100	2	1001001010000	4
	27	000011011	0000000001010	3	0001010001010	3	0100000100100	3	1000000000100	3	1001001010000	5
	28	000011100	0000000001010	4	0001010001010	4	0100000100100	4	1000000000100	4	1001001010010	1
35	29	000011101	0000000001010	5	0001010001010	5	0100000100100	5	1000000000100	5	1001001010010	2
	30	000011110	0000000001000	1	0001010100000	1	0100000100101	1	1000000000100	1	1001001010010	3
	31	000011111	0000000100000	2	0001010100000	2	0100000100101	2	1000000000100	2	1001001010010	4
	32	000100000	0000000100000	3	0001010100000	3	0100000100101	3	1000000000100	3	1001001010010	5
40	33	000100001	0000000100000	4	0001010100000	4	0100000100101	4	1000000000100	4	1001001010010	1
	34	000100010	0000000100000	5	0001010100000	5	0100000100101	5	1000000000100	5	1001001010010	2
	35	000100011	0000000100010	1	0001010100010	1	0100000101000	1	1000000000101	1	1001001010100	3
	36	000100100	0000000100010	2	0001010100010	2	0100000101000	2	1000000000101	2	1001001010100	4
	37	000100101	0000000100010	3	0001010100010	3	0100000101000	3	1000000000101	3	1001001010100	5
	38	000100110	0000000100010	4	0001010100010	4	0100000101000	4	1000000000101	4	1001010000000	1
45	39	000100111	0000000100010	5	0001010100010	5	0100000101000	5	1000000000101	5	1001010000000	2
	40	000101000	0000000100100	1	0001010100100	1	0100000101001	1	1000000000100	1	1001010000000	3
	41	000101001	0000000100100	2	0001010100100	2	0100000101001	2	1000000000100	2	1001010000000	4
	42	000101010	0000000100100	3	0001010100100	3	0100000101001	3	1000000000100	3	1001010000000	5
	43	000101011	0000000100100	4	0001010100100	4	0100000101001	4	1000000000100	4	1001010000010	1
50	44	000101100	0000000100100	5	0001010100100	5	0100000101001	5	1000000000100	5	1001010000010	2
	45	000101101	0000000101000	1	0001010101000	1	0100000101010	1	1000000000101	1	1001010000010	3
	46	000101110	0000000101000	2	0001010101000	2	0100000101010	2	1000000000101	2	1001010000010	4
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	48	000110000	0000000101000	4	0001010101000	4	0100000101010	4	1000000000101	4	1001010000100	1
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	50	000110010	0000000101010	1	0001010101010	1	0100000100000	1	1000000000101	1	1001010000100	3
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	57	000111001	0000001000000	3	0010000000000	3	0100000100000	3	1000000010000	3	10010100001010	5
	58	000111010	0000001000000	4	0010000000000	4	0100000100000	4	1000000010000	4	10010100001010	1
65	59	000111011	0000001000000	5	0010000000000	5	0100000100000	5	1000000010000	5	10010100001010	2
	60	000111100	0000001000010	1	0010000000010	1	0100000100001	1	1000000010001	1	10010100001010	3
	61	000111101	0000001000010	2	0010000000010	2	0100000100001	2	1000000010001	2	10010100001010	4
	62	000111110	0000001000010	3	0010000000010	3	0100000100001	3	1000000010001	3	10010100001010	5
70	63	000111111	0000001000010	4	0010000000010	4	0100000100001	4	1000000010001	4	10010100001000	1

Figure 4B

	Data bits	Channel bits	state Channel bits	state Channel bits	state Channel bits	state Channel bits	state
5	64	001000000	0000001000010	5 0010000000010	5 0100010000100	5 1000000100010	5 1001010010000 2
	65	001000001	0000001000100	1 0010000000010	1 0100010001000	1 1000000100100	1 1001010010000 3
	66	001000010	0000001000100	2 0010000000010	2 0100010001000	2 1000000100100	2 1001010010000 4
	67	001000011	0000001000100	3 0010000000010	3 0100010001000	3 1000000100100	3 1001010010000 5
	68	001000100	0000001000100	4 0010000000010	4 0100010001000	4 1000000100100	4 1001010010010 1
10	69	001000101	0000001000100	5 0010000000010	5 0100010001000	5 1000000100100	5 1001010010010 2
	70	001000110	0000001001000	1 0010000000100	1 0100010001010	1 1000000101000	1 1001010010010 3
	71	001000111	0000001001000	2 0010000000100	2 0100010001010	2 1000000101000	2 1001010010010 4
	72	001001000	0000001001000	3 0010000000100	3 0100010001010	3 1000000101000	3 1001010010010 5
	73	001001001	0000001001000	4 0010000000100	4 0100010001010	4 1000000101000	4 1001010010100 1
15	74	001001010	0000001001000	5 0010000000100	5 0100010001010	5 1000000101000	5 1001010010100 2
	75	001001011	0000001001010	1 0010000000101	1 0100010010000	1 1000000101010	1 1001010010101 3
	76	001001100	0000001001010	2 0010000000101	2 0100010010000	2 1000000101010	2 1001010010101 4
	77	001001101	0000001001010	3 0010000000101	3 0100010010000	3 1000000101010	3 1001010010101 5
	78	001001110	0000001001010	4 0010000000101	4 0100010010000	4 1000000101010	4 1001010100000 1
20	79	001001111	0000001001010	5 0010000000101	5 0100010010000	5 1000000101010	5 1001010100000 2
	80	001010000	0000001010000	1 0010000000100	1 0100010010010	1 1000000100000	1 1001010100000 3
	81	001010001	0000001010000	2 0010000000100	2 0100010010010	2 1000000100000	2 1001010100000 4
	82	001010010	0000001010000	3 0010000000100	3 0100010010010	3 1000000100000	3 1001010100000 5
	83	001010011	0000001010000	4 0010000000100	4 0100010010010	4 1000000100000	4 1001010100010 1
25	84	001010100	0000001010000	5 0010000000100	5 0100010010010	5 1000000100000	5 1001010100010 2
	85	001010101	0000001010010	1 0010000000101	1 0100010010010	1 1000000100010	1 1001010100010 3
	86	001010110	0000001010010	2 0010000000101	2 0100010010010	2 1000000100010	2 1001010100010 4
	87	001010111	0000001010010	3 0010000000101	3 0100010010010	3 1000000100010	3 1001010100010 5
	88	001011000	0000001010010	4 0010000000101	4 0100010010010	4 1000000100010	4 1001010100100 1
30	89	001011001	0000001010010	5 0010000000101	5 0100010010010	5 1000000100010	5 1001010100100 2
	90	001011010	0000001010100	1 0010000000100	1 0100010100000	1 1000000100010	1 1001010100101 3
	91	001011011	0000001010100	2 0010000000100	2 0100010100000	2 1000000100010	2 1001010100101 4
	92	001011100	0000001010100	3 0010000000100	3 0100010100000	3 1000000100010	3 1001010100101 5
	93	001011101	0000001010100	4 0010000000100	4 0100010100000	4 1000000100010	4 1001010101000 1
35	94	001011110	0000001010100	5 0010000000100	5 0100010100000	5 1000000100010	5 1001010101000 2
	95	001011111	0000001000000	1 0010000010000	1 0100010100010	1 1000000100100	1 1001010101000 3
	96	001100000	0000001000000	2 0010000010000	2 0100010100010	2 1000000100100	2 1001010101000 4
	97	001100001	0000001000000	3 0010000010000	3 0100010100010	3 1000000100100	3 1001010101000 5
	98	001100010	0000001000000	4 0010000010000	4 0100010100010	4 1000000100100	4 1001010101010 1
40	99	001100011	0000001000000	5 0010000010000	5 0100010100010	5 1000000100100	5 1001010101010 2
	100	001100100	0000001000001	1 0010000010001	1 0100010100010	1 1000000100101	1 1001010101010 3
	101	001100101	0000001000001	2 0010000010001	2 0100010100010	2 1000000100101	2 1001010101010 4
	102	001100110	0000001000001	3 0010000010001	3 0100010100010	3 1000000100101	3 1001010101010 5
	103	001100111	0000001000001	4 0010000010001	4 0100010100010	4 1000000100101	4 1010000000000 1
45	104	001101000	0000001000001	5 0010000010001	5 0100010100010	5 1000000100101	5 1010000000000 2
	105	001101001	0000001000010	1 0010000010001	1 0100010100010	1 1000000100010	1 1010000000000 3
	106	001101010	0000001000010	2 0010000010001	2 0100010100010	2 1000000100010	2 1010000000000 4
	107	001101011	0000001000010	3 0010000010001	3 0100010100010	3 1000000100010	3 1010000000000 5
	108	001101100	0000001000010	4 0010000010001	4 0100010100010	4 1000000100010	4 1010000000010 1
50	109	001101101	0000001000010	5 0010000010001	5 0100010100010	5 1000000100010	5 1010000000010 2
	110	001101110	0000001000010	1 0010000010001	1 0100010100101	1 1000000100010	1 1010000000010 3
	111	001101111	0000001000010	2 0010000010001	2 0100010100101	2 1000000100010	2 1010000000010 4
	112	001110000	0000001000010	3 0010000010001	3 0100010100101	3 1000000100010	3 1010000000010 5
	113	001110001	0000001000010	4 0010000010001	4 0100010100101	4 1000000100010	4 1010000000010 1
55	114	001110010	0000001000010	5 0010000010001	5 0100010100101	5 1000000100010	5 1010000000010 2
	115	001110011	0000001000010	1 0010000010010	1 0100010000000	1 1000000100100	1 1010000000010 3
	116	001110100	0000001000010	2 0010000010010	2 0100010000000	2 1000000100100	2 1010000000010 4
	117	001110101	0000001000010	3 0010000010010	3 0100010000000	3 1000000100100	3 1010000000010 5
	118	001110110	0000001000010	4 0010000010010	4 0100010000000	4 1000000100100	4 1010000000010 1
60	119	001110111	0000001000010	5 0010000010010	5 0100010000000	5 1000000100100	5 1010000000010 2
	120	001111000	0000001000000	1 0010000000000	1 0100010000000	1 1000000100000	1 1010000000000 3
	121	001111001	0000001000000	2 0010000000000	2 0100010000000	2 1000000100000	2 1010000000000 4
	122	001111010	0000001000000	3 0010000000000	3 0100010000000	3 1000000100000	3 1010000000000 5
	123	001111011	0000001000000	4 0010000000000	4 0100010000000	4 1000000100000	4 1010000000010 1
65	124	001111100	0000001000000	5 0010000000000	5 0100010000000	5 1000000100000	5 1010000000010 2
	125	001111101	0000001000010	1 0010000000010	1 0100010000010	1 1000000100001	1 1010000000010 3
	126	001111110	0000001000010	2 0010000000010	2 0100010000010	2 1000000100001	2 1010000000010 4
	127	001111111	0000001000010	3 0010000000010	3 0100010000010	3 1000000100001	3 1010000000010 5
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Figure 4C

	Data bits	Channel bits	state Channel bits	state Channel bits	state Channel bits	state Channel bits	state
5	128 010000000	0000010010010	4 0010001000010	4 0100100000100	4 1000010000010	4 1010000010000	1
	129 010000001	0000010010010	5 0010001000010	5 0100100000100	5 1000010000010	5 1010000010000	2
	130 010000010	0000010010100	1 0010001000010	1 0100100000100	1 1000010000010	1 1010000010000	3
	131 010000011	0000010010100	2 0010001000010	2 0100100000100	2 1000010000010	2 1010000010000	4
	132 010000100	0000010010100	3 0010001000010	3 0100100000100	3 1000010000010	3 1010000010000	5
10	133 010000101	0000010010100	4 0010001000010	4 0100100000100	4 1000010000010	4 1010000010010	1
	134 010000110	0000010010100	5 0010001000010	5 0100100000100	5 1000010000010	5 1010000010010	2
	135 010000111	0000010100000	1 0010001001000	1 0100100000101	1 1000010000010	1 1010000010010	3
	136 010001000	0000010100000	2 0010001001000	2 0100100000101	2 1000010000010	2 1010000010010	4
	137 010001001	0000010100000	3 0010001001000	3 0100100000101	3 1000010000010	3 1010000010010	5
15	138 010001010	0000010100000	4 0010001001000	4 0100100000101	4 1000010000010	4 1010000010100	1
	139 010001011	0000010100000	5 0010001001000	5 0100100000101	5 1000010000010	5 1010000010100	2
	140 010001100	0000010100010	1 0010001001010	1 0100100000100	1 1000010000010	1 1010000010100	3
	141 010001101	0000010100010	2 0010001001010	2 0100100000100	2 1000010000010	2 1010000010100	4
	142 010001110	0000010100010	3 0010001001010	3 0100100000100	3 1000010000010	3 1010000010100	5
20	143 010001111	0000010100010	4 0010001001010	4 0100100000100	4 1000010000010	4 1010000010000	1
	144 010010000	0000010100010	5 0010001001010	5 0100100000100	5 1000010000010	5 1010000010000	2
	145 010010001	0000010100010	1 0010001010000	1 0100100000101	1 1000010010000	1 1010000010000	3
	146 010010010	0000010100010	2 0010001010000	2 0100100000101	2 1000010010000	2 1010000010000	4
	147 010010011	0000010100010	3 0010001010000	3 0100100000101	3 1000010010000	3 1010000010000	5
25	148 010010100	0000010100010	4 0010001010000	4 0100100000101	4 1000010010000	4 1010000010000	1
	149 010010101	0000010100010	5 0010001010000	5 0100100000101	5 1000010010000	5 1010000010000	2
	150 010010110	0000010101000	1 0010001010010	1 0100100000100	1 1000010010010	1 1010000010010	3
	151 010010111	0000010101000	2 0010001010010	2 0100100000100	2 1000010010010	2 1010000010010	4
	152 010011000	0000010101000	3 0010001010010	3 0100100000100	3 1000010010010	3 1010000010010	5
30	153 010011001	0000010101000	4 0010001010010	4 0100100000100	4 1000010010010	4 1010000010010	1
	154 010011010	0000010101000	5 0010001010010	5 0100100000100	5 1000010010010	5 1010000010010	2
	155 010011011	0000010101010	1 0010001010100	1 0100100100000	1 1000010010100	1 1010000010010	3
	156 010011100	0000010101010	2 0010001010100	2 0100100100000	2 1000010010100	2 1010000010010	4
	157 010011101	0000010101010	3 0010001010100	3 0100100100000	3 1000010010100	3 1010000010010	5
35	158 010011110	0000010101010	4 0010001010100	4 0100100100000	4 1000010010100	4 1010000010010	1
	159 010011111	0000010101010	5 0010001010100	5 0100100100000	5 1000010010100	5 1010000010010	2
	160 010100000	0000100000000	1 0010010000000	1 0100100100010	1 1000010100000	1 1010000010000	3
	161 010100001	0000100000000	2 0010010000000	2 0100100100010	2 1000010100000	2 1010000010000	4
	162 010100010	0000100000000	3 0010010000000	3 0100100100010	3 1000010100000	3 1010000010000	5
40	163 010100011	0000100000000	4 0010010000000	4 0100100100010	4 1000010100000	4 1010000010010	1
	164 0101000100	0000100000000	5 0010010000000	5 0100100100010	5 1000010100000	5 1010000010010	2
	165 0101000101	0000100000010	1 0010010000010	1 0100100100010	1 1000010100010	1 1010000010010	3
	166 0101000110	0000100000010	2 0010010000010	2 0100100100010	2 1000010100010	2 1010000010010	4
	167 0101000111	0000100000010	3 0010010000010	3 0100100100010	3 1000010100010	3 1010000010010	5
45	168 010101000	0000100000010	4 0010010000010	4 0100100100010	4 1000010100010	4 1010000010000	1
	169 010101001	0000100000010	5 0010010000010	5 0100100100010	5 1000010100010	5 1010000010000	2
	170 010101010	0000100000010	1 0010010000010	1 0100100100010	1 1000010100010	1 1010000010000	3
	171 010101011	0000100000010	2 0010010000010	2 0100100100010	2 1000010100010	2 1010000010000	4
	172 010101100	0000100000010	3 0010010000010	3 0100100100010	3 1000010100010	3 1010000010000	5
50	173 010101101	0000100000010	4 0010010000010	4 0100100100010	4 1000010100010	4 1010000010000	1
	174 010101110	0000100000010	5 0010010000010	5 0100100100010	5 1000010100010	5 1010000010000	2
	175 010101111	0000100000010	1 0010010000010	1 0100100100010	1 1000010100010	1 1010000010000	3
	176 010110000	0000100000010	2 0010010000010	2 0100100100010	2 1000010100010	2 1010000010000	4
	177 010110001	0000100000010	3 0010010000010	3 0100100100010	3 1000010100010	3 1010000010000	5
55	178 010110010	0000100000010	4 0010010000010	4 0100100100010	4 1000010100010	4 1010000010000	1
	179 010110011	0000100000010	5 0010010000010	5 0100100100010	5 1000010100010	5 1010000010000	2
	180 010110100	0000100000010	1 0010010000010	1 0100101000000	1 1000010100010	1 1010000010000	3
	181 010110101	0000100000010	2 0010010000010	2 0100101000000	2 1000010100010	2 1010000010000	4
	182 010110110	0000100000010	3 0010010000010	3 0100101000000	3 1000010100010	3 1010000010000	5
60	183 010110111	0000100000010	4 0010010000010	4 0100101000000	4 1000010100010	4 1010000010000	1
	184 010111000	0000100000010	5 0010010000010	5 0100101000000	5 1000010100010	5 1010000010000	2
	185 010111001	0000100000000	1 0010010000000	1 0100101000000	1 1000010000000	1 1010000010000	3
	186 010111010	0000100000000	2 0010010000000	2 0100101000000	2 1000010000000	2 1010000010000	4
	187 010111011	0000100000000	3 0010010000000	3 0100101000000	3 1000010000000	3 1010000010000	5
65	188 010111100	0000100000000	4 0010010000000	4 0100101000000	4 1000010000000	4 1010000010010	1
	189 010111101	0000100000000	5 0010010000000	5 0100101000000	5 1000010000000	5 1010000010010	2
	190 010111110	0000100000010	1 0010010000010	1 0100101000010	1 1000010000010	1 1010000010010	3
	191 010111111	0000100000010	2 0010010000010	2 0100101000010	2 1000010000010	2 1010000010010	4

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Figure 4D

	Data bits	Channel bits	state Channel bits	state Channel bits	state Channel bits	state Channel bits	state
5	192 011000000	0000100010010	3 0010010010010	3 0100101000100	3 1000100000010	3 1010001001010	5
	193 011000001	0000100010010	4 0010010010010	4 0100101000100	4 1000100000010	4 1010001010000	1
	194 011000010	0000100010010	5 0010010010010	5 0100101000100	5 1000100000010	5 1010001010000	2
	195 011000011	0000100010100	1 0010010010100	1 0100101001000	1 1000100000100	1 1010001010000	3
	196 011000100	0000100010100	2 0010010010100	2 0100101001000	2 1000100000100	2 1010001010000	4
10	197 011000101	0000100010100	3 0010010010100	3 0100101001000	3 1000100000100	3 1010001010000	5
	198 011000110	0000100010100	4 0010010010100	4 0100101001000	4 1000100000100	4 1010001010010	1
	199 011000111	0000100010100	5 0010010010100	5 0100101001000	5 1000100000100	5 1010001010010	2
	200 011001000	0000100100000	1 0010010100000	1 0100101001010	1 1000100001000	1 1010001010010	3
	201 011001001	0000100100000	2 0010010100000	2 0100101001010	2 1000100001000	2 1010001010010	4
	202 011001010	0000100100000	3 0010010100000	3 0100101001010	3 1000100001000	3 1010001010010	5
15	203 011001011	0000100100000	4 0010010100000	4 0100101001010	4 1000100001000	4 1010001010010	1
	204 011001100	0000100100000	5 0010010100000	5 0100101001010	5 1000100001000	5 1010001010010	2
	205 011001101	0000100100010	1 0010010100010	1 0100101010000	1 1000100001010	1 1010001010100	3
	206 011001110	0000100100010	2 0010010100010	2 0100101010000	2 1000100001010	2 1010001010100	4
20	207 011001111	0000100100010	3 0010010100010	3 0100101010000	3 1000100001010	3 1010001010100	5
	208 011010000	0000100100010	4 0010010100010	4 0100101010000	4 1000100001010	4 1010010000000	1
	209 011010001	0000100100010	5 0010010100010	5 0100101010000	5 1000100001010	5 1010010000000	2
	210 011010010	0000100100100	1 0010010100100	1 0100101010010	1 1000100010000	1 1010010000000	3
	211 011010011	0000100100100	2 0010010100100	2 0100101010010	2 1000100010000	2 1010010000000	4
25	212 011010100	0000100100100	3 0010010100100	3 0100101010010	3 1000100010000	3 1010010000000	5
	213 011010101	0000100100100	4 0010010100100	4 0100101010010	4 1000100010000	4 1010010000010	1
	214 011010110	0000100100100	5 0010010100100	5 0100101010010	5 1000100010000	5 1010010000010	2
	215 011010111	0000100101000	1 0010010101000	1 0100101010100	1 1000100010010	1 1010010000010	3
30	216 011011000	0000100101000	2 0010010101000	2 0100101010100	2 1000100010010	2 1010010000010	4
	217 011011001	0000100101000	3 0010010101000	3 0100101010100	3 1000100010010	3 1010010000010	5
	218 011011010	0000100101000	4 0010010101000	4 0100101010100	4 1000100010010	4 1010010000100	1
	219 011011011	0000100101000	5 0010010101000	5 0100101010100	5 1000100010010	5 1010010000100	2
	220 011011100	0000100101010	1 0010010101010	1 0101000000000	1 1000100010100	1 1010010000100	3
	221 011011101	0000100101010	2 0010010101010	2 0101000000000	2 1000100010100	2 1010010000100	4
35	222 011011110	0000100101010	3 0010010101010	3 0101000000000	3 1000100010100	3 1010010000100	5
	223 011011111	0000100101010	4 0010010101010	4 0101000000000	4 1000100010100	4 1010010000100	1
	224 011100000	0000100101010	5 0010010101010	5 0101000000000	5 1000100010100	5 1010010000100	2
	225 011100001	0000101000000	1 0010100000000	1 0101000000010	1 1000100100000	1 1010010001000	3
40	226 011100010	0000101000000	2 0010100000000	2 0101000000010	2 1000100100000	2 1010010001000	4
	227 011100011	0000101000000	3 0010100000000	3 0101000000010	3 1000100100000	3 1010010001000	5
	228 011100100	0000101000000	4 0010100000000	4 0101000000010	4 1000100100000	4 1010010001010	1
	229 011100101	0000101000000	5 0010100000000	5 0101000000010	5 1000100100000	5 1010010001010	2
45	230 011100110	0000101000010	1 0010100000010	1 0101000000100	1 1000100100010	1 1010010001010	3
	231 011100111	0000101000010	2 0010100000010	2 0101000000100	2 1000100100010	2 1010010001010	4
	232 011101000	0000101000010	3 0010100000010	3 0101000000100	3 1000100100010	3 1010010001010	5
	233 011101001	0000101000010	4 0010100000010	4 0101000000100	4 1000100100010	4 1010010010000	1
	234 011101010	0000101000010	5 0010100000010	5 0101000000100	5 1000100100010	5 1010010010000	2
	235 011101011	0000101000010	1 0010100000100	1 0101000001000	1 1000100100100	1 1010010010000	3
50	236 011101100	0000101000010	2 0010100000100	2 0101000001000	2 1000100100100	2 1010010010000	4
	237 011101101	0000101000010	3 0010100000100	3 0101000001000	3 1000100100100	3 1010010010000	5
	238 011101110	0000101000010	4 0010100000100	4 0101000001000	4 1000100100100	4 1010010010010	1
	239 011101111	0000101000010	5 0010100000100	5 0101000001000	5 1000100100100	5 1010010010010	2
55	240 011110000	0000101001000	1 0010100001000	1 0101000001010	1 1000100101000	1 1010010010010	3
	241 011110001	0000101001000	2 0010100001000	2 0101000001010	2 1000100101000	2 1010010010010	4
	242 011110010	0000101001000	3 0010100001000	3 0101000001010	3 1000100101000	3 1010010010010	5
	243 011110011	0000101001000	4 0010100001000	4 0101000001010	4 1000100101000	4 1010010010100	1
	244 011110100	0000101001000	5 0010100001000	5 0101000001010	5 1000100101000	5 1010010010100	2
60	245 011110101	0000101001010	1 0010100001010	1 0101000001000	1 1000100101010	1 1010010010100	3
	246 011110110	0000101001010	2 0010100001010	2 0101000001000	2 1000100101010	2 1010010010100	4
	247 011110111	0000101001010	3 0010100001010	3 0101000001000	3 1000100101010	3 1010010010100	5
	248 011111000	0000101001010	4 0010100001010	4 0101000001000	4 1000100101010	4 1010010100000	1
65	249 011111001	0000101001010	5 0010100001010	5 0101000001000	5 1000100101010	5 1010010100000	2
	250 011111010	0000101010000	1 0010100001000	1 0101000001000	1 1000101000000	1 1010010100000	3
	251 011111011	0000101010000	2 0010100001000	2 0101000001000	2 1000101000000	2 1010010100000	4
	252 011111100	0000101010000	3 0010100001000	3 0101000001000	3 1000101000000	3 1010010100000	5
	253 011111101	0000101010000	4 0010100001000	4 0101000001000	4 1000101000000	4 1010010100010	1
	254 011111110	0000101010000	5 0010100001000	5 0101000001000	5 1000101000000	5 1010010100010	2
70	255 011111111	0000101010010	1 0010100001001	1 0101000001000	1 1000101000010	1 1010010100010	3

Figure 4E

	Data bits	Channel bits	state	Channel bits	state	Channel bits	state	Channel bits	state	
5	256	100000000	0000101010010	2	00101000010010	2	01010000010100	2	10001010000010	4
	257	100000001	0000101010010	3	00101000010010	3	01010000010100	3	10001010000100	5
	258	100000010	0000101010010	4	00101000010010	4	01010000010100	4	10001010000100	1
	259	100000011	0000101010010	5	00101000010010	5	01010000010100	5	10001010000100	2
	260	100000100	0000101010100	1	00101000010100	1	01010000100000	1	10001010000100	3
10	261	100000101	0000101010100	2	00101000010100	2	01010000100000	2	10001010000100	4
	262	100000110	0000101010100	3	00101000010100	3	01010000100000	3	10001010000100	5
	263	100000111	0000101010100	4	00101000010100	4	01010000100000	4	10001010000100	1
	264	100001000	0000101010100	5	00101000010100	5	01010000100000	5	10001010000100	2
	265	100001001	0001000000000	1	00101000100000	1	01010000100000	1	10001010000100	3
15	266	100001010	0001000000000	2	00101000100000	2	01010000100000	2	10001010000100	4
	267	100001011	0001000000000	3	00101000100000	3	01010000100000	3	10001010000100	5
	268	100001100	0001000000000	4	00101000100000	4	01010000100000	4	10001010000100	1
	269	100001101	0001000000000	5	00101000100000	5	01010000100000	5	10001010000100	2
	270	100001110	0001000000010	1	00101000100000	1	01010000100000	1	10001010000100	3
20	271	100001111	0001000000010	2	00101000100000	2	01010000100000	2	10001010000100	4
	272	100010000	0001000000010	3	00101000100000	3	01010000100000	3	10001010000100	5
	273	100010001	0001000000010	4	00101000100000	4	01010000100000	4	10001010000000	1
	274	100010010	0001000000010	5	00101000100000	5	01010000100000	5	10001010000000	2
	275	100010011	0001000000010	1	00101000100000	1	01010000100000	1	10001010000000	3
25	276	100010100	0001000000010	2	00101000100000	2	01010000100000	2	10001010000000	4
	277	100010101	0001000000010	3	00101000100000	3	01010000100000	3	10001010000000	5
	278	100010110	0001000000010	4	00101000100000	4	01010000100000	4	10001010000000	1
	279	100010111	0001000000010	5	00101000100000	5	01010000100000	5	10001010000000	2
	280	100011000	0001000000100	1	00101000100000	1	01010000100000	1	10001010000000	3
30	281	100011001	0001000000100	2	00101000100000	2	01010000100000	2	10001010000000	4
	282	100011010	0001000000100	3	00101000100000	3	01010000100000	3	10001010000000	5
	283	100011011	0001000000100	4	00101000100000	4	01010000100000	4	10001010000000	1
	284	100011100	0001000000100	5	00101000100000	5	01010000100000	5	10001010000000	2
	285	100011101	0001000000100	1	00101000100000	1	01010000100000	1	10001010000000	3
35	286	100011110	0001000000100	2	00101000100000	2	01010000100000	2	10001010000000	4
	287	100011111	0001000000100	3	00101000100000	3	01010000100000	3	10001010000000	5
	288	100100000	0001000000100	4	00101000100000	4	01010000100000	4	10001010000000	1
	289	100100001	0001000000100	5	00101000100000	5	01010000100000	5	10001010000000	2
	290	100100010	0001000000100	1	00101000100000	1	01010000100000	1	10001000000000	3
40	291	100100011	0001000000100	2	00101000100000	2	01010000100000	2	10010000000000	4
	292	100100100	0001000000100	3	00101000100000	3	01010000100000	3	10010000000000	5
	293	100100101	0001000000100	4	00101000100000	4	01010000100000	4	10010000000000	1
	294	100100110	0001000000100	5	00101000100000	5	01010000100000	5	10010000000000	2
	295	100100111	0001000000100	1	00101000100000	1	01010000100000	1	10101000000000	3
45	296	100101000	0001000000100	2	00101000100000	2	01010000100000	2	10101000000000	4
	297	100101001	0001000000100	3	00101000100000	3	01010000100000	3	10101000000000	5
	298	100101010	0001000000100	4	00101000100000	4	01010000100000	4	10101000000000	1
	299	100101011	0001000000100	5	00101000100000	5	01010000100000	5	10101000000000	2
	300	100101100	0001000000100	1	00101000100000	1	01010000100000	1	10101000000000	3
50	301	100101101	0001000000100	2	00101000100000	2	01010000100000	2	10101000000000	4
	302	100101110	0001000000100	3	00101000100000	3	01010000100000	3	10101000000000	5
	303	100101111	0001000000100	4	00101000100000	4	01010000100000	4	10101000000000	1
	304	100110000	0001000000100	5	00101000100000	5	01010000100000	5	10101000000000	2
	305	100110001	00010000100000	1	00101000100000	1	01010000100000	1	10010000000000	3
55	306	100110010	00010000100000	2	00101000100000	2	01010000100000	2	10010000000000	4
	307	100110011	00010000100000	3	00101000100000	3	01010000100000	3	10010000000000	5
	308	100110100	00010000100000	4	00101000100000	4	01010000100000	4	10010000000000	1
	309	100110101	00010000100000	5	00101000100000	5	01010000100000	5	10010000000000	2
	310	100110110	00010000100000	1	00101000100000	1	01010000100000	1	10010000000000	3
60	311	100110111	00010000100000	2	00101000100000	2	01010000100000	2	10010000000000	4
	312	100111000	00010000100000	3	00101000100000	3	01010000100000	3	10010000000000	5
	313	100111001	00010000100000	4	00101000100000	4	01010000100000	4	10010000000000	1
	314	100111010	00010000100000	5	00101000100000	5	01010000100000	5	10010000000000	2
	315	100111011	00010000100000	1	00101000100000	1	01010000100000	1	10010000000000	3
65	316	100111100	00010000100000	2	00101000100000	2	01010000100000	2	10010000000000	4
	317	100111101	00010000100000	3	00101000100000	3	01010000100000	3	10010000000000	5
	318	100111110	00010000100000	4	00101000100000	4	01010000100000	4	10010000000000	1
	319	100111111	00010000100000	5	00101000100000	5	01010000100000	5	10010000000000	2

Figure 4F

	Data bits	Channel bits	state	Channel bits	state	Channel bits	state	Channel bits	state
5	320 101000000	0001000101000	1	0010101010010	1	0101001010100	1	1001000010010	1
	321 101000001	0001000101000	2	0010101010010	2	0101001010100	2	1001000010010	2
	322 101000010	0001000101000	3	0010101010010	3	0101001010100	3	1001000010010	3
	323 101000011	0001000101000	4	0010101010010	4	0101001010100	4	1001000010010	4
	324 101000100	0001000101000	5	0010101010010	5	0101001010100	5	1001000010010	5
	325 101000101	0001000101010	1	0010101010100	1	0101010000000	1	1001000010100	1
10	326 101000110	0001000101010	2	0010101010100	2	0101010000000	2	1001000010100	2
	327 101000111	0001000101010	3	0010101010100	3	0101010000000	3	1001000010100	3
	328 101001000	0001000101010	4	0010101010100	4	0101010000000	4	1001000010100	4
	329 101001001	0001000101010	5	0010101010100	5	0101010000000	5	1001000010100	5
	330 101001010	0001001000000	1	0100000000010	1	0101010000010	1	1001000100000	1
15	331 101001011	0001001000000	2	0100000000010	2	0101010000010	2	1001000100000	2
	332 101001100	0001001000000	3	0100000000010	3	0101010000010	3	1001000100000	3
	333 101001101	0001001000000	4	0100000000010	4	0101010000010	4	1001000100000	4
	334 101001110	0001001000000	5	0100000000010	5	0101010000010	5	1001000100000	5
	335 101001111	0001001000010	1	0100000000100	1	0101010000100	1	1001000100010	1
20	336 101010000	0001001000010	2	0100000000100	2	0101010000100	2	1001000100010	2
	337 101010001	0001001000010	3	0100000000100	3	0101010000100	3	1001000100010	3
	338 101010010	0001001000010	4	0100000000100	4	0101010000100	4	1001000100010	4
	339 101010011	0001001000010	5	0100000000100	5	0101010000100	5	1001000100010	5
	340 101010100	0001001000010	1	0100000000100	1	0101010000100	1	1001000100010	1
25	341 101010101	0001001000010	2	0100000000100	2	0101010000100	2	1001000100010	2
	342 101010110	0001001000010	3	0100000000100	3	0101010000100	3	1001000100010	3
	343 101010111	0001001000010	4	0100000000100	4	0101010000100	4	1001000100010	4
	344 101011000	0001001000010	5	0100000000100	5	0101010000100	5	1001000100010	5
	345 101011001	0001001000010	1	01000000001010	1	01010100001010	1	10010001000010	1
30	346 101011010	0001001000010	2	01000000001010	2	01010100001010	2	10010001000010	2
	347 101011011	0001001000010	3	01000000001010	3	01010100001010	3	10010001000010	3
	348 101011100	0001001000010	4	01000000001010	4	01010100001010	4	10010001000010	4
	349 101011101	0001001000010	5	01000000001010	5	01010100001010	5	10010001000010	5
	350 101011110	0001001000010	1	01000000001000	1	01010100001000	1	10010001001010	1
35	351 101011111	0001001000010	2	01000000001000	2	01010100001000	2	10010001001010	2
	352 101100000	0001001000010	3	01000000001000	3	01010100001000	3	10010001001010	3
	353 101100001	0001001000010	4	01000000001000	4	01010100001000	4	10010001001010	4
	354 101100010	0001001000010	5	01000000001000	5	01010100001000	5	10010001001010	5
	355 101100011	0001001000010	1	010000000010010	1	010101000010010	1	10010001000000	1
40	356 101100100	0001001000000	2	010000000010010	2	010101000010010	2	10010001000000	2
	357 101100101	0001001000000	3	010000000010010	3	010101000010010	3	10010001000000	3
	358 101100110	0001001000000	4	010000000010010	4	010101000010010	4	10010001000000	4
	359 101100111	0001001000000	5	010000000010010	5	010101000010010	5	10010001000000	5
	360 101101000	0001001000010	1	010000000010100	1	010101000010100	1	10010001000010	1
45	361 101101001	0001001000010	2	010000000010100	2	010101000010100	2	10010001000010	2
	362 101101010	0001001000010	3	010000000010100	3	010101000010100	3	10010001000010	3
	363 101101011	0001001000010	4	010000000010100	4	010101000010100	4	10010001000010	4
	364 101101100	0001001000010	5	010000000010100	5	010101000010100	5	10010001000010	5
	365 101101101	0001001000010	1	010000000010100	1	010101000000000	1	10010001000000	1
50	366 101101110	0001001000010	2	010000000010000	2	010101000000000	2	10010001000000	2
	367 101101111	0001001000010	3	010000000010000	3	010101000000000	3	10010001000000	3
	368 101110000	0001001000010	4	010000000010000	4	010101000000000	4	10010001000000	4
	369 101110001	0001001000010	5	010000000010000	5	010101000000000	5	10010001000000	5
	370 101110010	0001010000000	1	010000000000010	1	010101000000010	1	10010001000000	1
55	371 101110011	0001010000000	2	010000000000010	2	010101000000010	2	10010001000000	2
	372 101110100	0001010000000	3	010000000000010	3	010101000000010	3	10010001000000	3
	373 101110101	0001010000000	4	010000000000010	4	010101000000010	4	10010001000000	4
	374 101110110	0001010000000	5	010000000000010	5	010101000000010	5	10010001000000	5
	375 101110111	0001010000000	1	010000000000010	1	010101000000010	1	10010001000000	1
60	376 101111000	0001010000000	2	010000000000010	2	010101000000010	2	10010001000000	2
	377 101111001	0001010000000	3	010000000000010	3	010101000000010	3	10010001000000	3
	378 101111010	0001010000000	4	010000000000010	4	010101000000010	4	10010001000000	4
	379 101111011	0001010000000	5	010000000000010	5	010101000000010	5	10010001000000	5
	380 101111100	0000000000010	1	00010010010001	1	01000000000001	1	10010001000001	1
65	381 101111101	0000000000010	2	00010010010001	2	01000000000001	2	10010001000001	2
	382 101111110	0000000000010	3	00010010010001	3	01000000000001	3	10010001000001	3
	383 101111111	0000000000010	4	00010010010101	4	01000000000010	4	10010001000001	4

Figure 4G

	Data bits	Channel bits	state	Channel bits	state	Channel bits	state	Channel bits	state	Channel bits	state	
5	384	1100000000	0000000001001	2	0001001010101	2	01000000000101	2	10000000000101	2	1001001010101	1
	385	1100000001	0000000001001	3	0001001010101	3	01000000000101	3	10000000000101	3	1001001010101	2
	386	1100000010	0000000001001	1	00010100000001	1	01000000000101	1	10000000000101	1	1001001010101	3
	387	1100000011	0000000001001	2	00010100000001	2	01000000000101	2	10000000000101	2	10010100000001	1
	388	1100000100	0000000001001	3	00010100000001	3	01000000000101	3	10000000000101	3	10010100000001	2
10	389	1100000101	00000000010101	1	00010100000101	1	01000000010001	1	10000000010001	1	10010100000001	3
	390	1100000110	00000000010101	2	00010100000101	2	01000000010001	2	10000000010001	2	10010100000101	1
	391	1100000111	00000000010101	3	00010100000101	3	01000000010001	3	10000000010001	3	10010100000101	2
	392	1100010000	00000000100001	1	00010100001001	1	01000000010101	1	10000000010101	1	10010100000101	3
	393	1100010001	00000000100001	2	00010100001001	2	01000000010101	2	10000000010101	2	10010100000101	1
15	394	1100010010	00000000100001	3	00010100001001	3	01000000010101	3	10000000010101	3	10010100001001	2
	395	1100010011	00000000100101	1	00010100010001	1	01000000010001	1	10000000000001	1	10010100001001	3
	396	1100010100	00000000100101	2	00010100010001	2	01000000010001	2	10000000000001	2	10010100010001	1
	397	1100010101	00000000100101	3	00010010010001	3	01000000000001	3	10000000000001	3	10010100010001	2
	398	1100010110	00000000101001	1	00010100010101	1	010000000100101	1	100000000100101	1	10010100010001	3
20	399	1100010111	00000000101001	2	00010100010101	2	010000000100101	2	100000000100101	2	10010100010101	1
	400	1100100000	00000000101001	3	00010100010101	3	010000000100101	3	100000000100101	3	10010100010101	2
	401	1100100001	00000000100001	1	00010101000001	1	010000000101001	1	100000000101001	1	10010100010101	3
	402	1100100010	00000000100001	2	00010101000001	2	010000000101001	2	100000000101001	2	10010101000001	1
	403	1100100011	00000000100001	3	00010101000001	3	010000000101001	3	100000000101001	3	10010101000001	2
25	404	1100100100	000000001000101	1	00010101000101	1	01000000000001	1	10000000000001	1	10010101000001	3
	405	1100100101	000000001000101	2	00010101000101	2	01000000000001	2	10000000000001	2	10010101000101	1
	406	1100100110	000000001000101	3	00010101000101	3	01000000000001	3	10000000000001	3	10010101000101	2
	407	1100100111	000000001001001	1	00010101010001	1	010000000000101	1	100000000000101	1	10010101010001	3
	408	1100110000	000000001001001	2	00010101010001	2	010000000000101	2	100000000000101	2	10010101010001	1
30	409	1100110001	000000001001001	3	00010101010001	3	010000000000101	3	100000000000101	3	10010101010001	2
	410	1100110010	000000001010001	1	000100000000001	1	010000000000101	1	100000000000101	1	10010101010001	3
	411	1100110011	000000001010001	2	000100000000001	2	010000000000101	2	100000000000101	2	10010000000001	1
	412	1100110100	000000001010001	3	000100000000001	3	010000000000101	3	100000000000101	3	100100000000001	2
	413	1100110101	000000001010101	1	000100000000101	1	010000000000101	1	100000000000101	1	100100000000001	3
35	414	1100110110	000000001010101	2	000100000000101	2	010000000000101	2	100000000000101	2	100100000000001	1
	415	1100110111	000000001010101	3	000100000000101	3	010000000000101	3	100000000000101	3	100100000000001	2
	416	1101000000	000000100000001	1	0001000000001001	1	010000000000101	1	100000000000101	1	100100000000001	3
	417	1101000001	000000100000001	2	0001000000001001	2	010000000000101	2	100000000000101	2	100100000000001	1
	418	1101000010	000000100000001	3	000100000000001	3	010000000000101	3	100000000000101	3	100100000000001	2
40	419	1101000011	000000100000101	1	000100000000001	1	010000000000001	1	100000000000001	1	100100000000001	3
	420	1101000100	000000100000101	2	000100000000001	2	010000000000001	2	100000000000001	2	100100000000001	1
	421	1101000101	000000100000101	3	000100000000001	3	010000000000001	3	100000000000001	3	100100000000001	2
	422	1101000110	000000100000101	1	000100000000101	1	010000000000101	1	100000000000101	1	100100000000001	3
	423	1101000111	000000100000101	2	000100000000101	2	010000000000101	2	100000000000101	2	100100000000101	1
45	424	1101010000	000000100000101	3	000100000000101	3	010000000000101	3	100000000000101	3	100100000000101	2
	425	1101010001	00000010000010001	1	000100000000001	1	010000000000001	1	100000000000001	1	100100000000101	3
	426	1101010010	00000010000010001	2	000100000000001	2	010000000000001	2	100000000000001	2	100100000000001	1
	427	1101010011	00000010000010001	3	000100000000001	3	010000000000001	3	100000000000001	3	100100000000001	2
	428	1101010100	0000001000010101	1	000100000000101	1	010000000000001	1	100000000000001	1	100100000000001	3
50	429	1101010101	0000001000010101	2	000100000000101	2	010000000000001	2	100000000000001	2	100100000000001	1
	430	1101010110	0000001000010101	3	000100000000101	3	010000000000001	3	100000000000001	3	100100000000001	2
	431	1101010111	0000001010000001	1	0001000000001001	1	010000000000001	1	100000000000001	1	100100000000001	3
	432	1101010000	0000001010000001	2	0001000000001001	2	010000000000001	2	100000000000001	2	100100000000001	1
	433	1101010001	0000001010000001	3	0001000000001001	3	010000000000001	3	100000000000001	3	100100000000001	2
55	434	1101010010	000000101000001	1	000100000000001	1	010000000000001	1	100000000000001	1	100100000000001	3
	435	1101010011	000000101000001	2	000100000000001	2	010000000000001	2	100000000000001	2	100100000000001	1
	436	1101010100	000000101000001	3	000100000000001	3	010000000000001	3	100000000000001	3	100100000000001	2
	437	1101010101	000000101000001	1	000100000000001	1	010000000000001	1	100000000000001	1	100100000000001	3
	438	1101010110	000000101000001	2	000100000000001	2	010000000000001	2	100000000000001	2	100100000000001	1
60	439	1101010111	000000101000001	3	000100000000001	3	010000000000001	3	100000000000001	3	100100000000001	2
	440	1101110000	000010000000001	1	000100000000001	1	010000000000001	1	100000000000001	1	100100000000001	3
	441	1101110001	000010000000001	2	000100000000001	2	010000000000001	2	100000000000001	2	100100000000001	1
	442	1101110010	000010000000001	3	000100000000001	3	010000000000001	3	100000000000001	3	100100000000001	2
	443	1101110011	000010000000001	1	000100000000001	1	010000000000001	1	100000000000001	1	100100000000001	3
65	444	1101110100	000010000000001	2	000100000000001	2	010000000000001	2	100000000000001	2	100100000000001	1
	445	1101110101	000010000000001	3	000100000000001	3	010000000000001	3	100000000000001	3	100100000000001	2
	446	1101110110	000010000000001	1	000100000000001	1	010000000000001	1	100000000000001	1	100100000000001	3
	447	1101110111	000010000000001	2	000100000000001	2	010000000000001	2	100000000000001	2	100100000000001	1

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Figure 4H

		Data bits	Channel bits	state	Channel bits	state	Channel bits	state	Channel bits	state	Channel bits	state
5	448	111000000	0000100001001	3	0010001010101	3	0100100000101	3	1000100000101	3	1010001010101	2
	449	111000001	0000100010001	1	0010010000001	1	0100100000101	1	1000100000101	1	1010001010101	3
	450	111000010	0000100010001	2	0010010000001	2	0100100000101	2	1000100000101	2	1010010000001	1
	451	111000011	0000100010001	3	0010010000001	3	0100100000101	3	1000100000101	3	1010010000001	2
	452	111000100	0000100010101	1	0010010000010	1	0100100001001	1	1000100001001	1	1010010000001	3
10	453	111000101	0000100010101	2	0010010000010	2	0100100001001	2	1000100001001	2	1010010000010	1
	454	111000110	0000100010101	3	0010010000010	3	0100100001001	3	1000100001001	3	1010010000010	2
	455	111000111	0000100100001	1	0010010000101	1	0100100001010	1	1000100001010	1	1010010000101	3
	456	111001000	0000100100001	2	0010010000101	2	0100100001010	2	1000100001010	2	1010010000101	1
	457	111001001	0000100100001	3	0010010000101	3	0100100001010	3	1000100001010	3	1010010000101	2
15	458	111001010	0000100100101	1	0010010010001	1	0100100100001	1	1000100100001	1	1010010000101	3
	459	111001011	0000100100101	2	0010010010001	2	0100100100001	2	1000100100001	2	1010010000101	1
	460	111001100	0000100100101	3	0010010010001	3	0100100100001	3	1000100100001	3	1010010000101	2
	461	111001101	0000100101001	1	0010010010101	1	0100100100101	1	1000100100101	1	1010010000101	3
	462	111001110	0000100101001	2	0010010010101	2	0100100100101	2	1000100100101	2	1010010000101	1
20	463	111001111	0000100101001	3	0010010010101	3	0100100100101	3	1000100100101	3	1010010000101	2
	464	111010000	0000101000001	1	0010010100001	1	0100100101001	1	1000100101001	1	1010010000101	3
	465	111010001	0000101000001	2	0010010100001	2	0100100101001	2	1000100101001	2	1010010000101	1
	466	111010010	0000101000001	3	0010010100001	3	0100100101001	3	1000100101001	3	1010010000101	2
	467	111010011	0000101000010	1	0010010100010	1	0100101000001	1	1000101000001	1	1010010000101	3
25	468	111010100	0000101000010	2	0010010100010	2	0100101000001	2	1000101000001	2	1010010000101	1
	469	111010101	0000101000010	3	0010010100010	3	0100101000001	3	1000101000001	3	1010010000101	2
	470	111010110	0000101001001	1	0010010101001	1	0100101000010	1	1000101000010	1	1010010000101	3
	471	111010111	0000101001001	2	0010010101001	2	0100101000010	2	1000101000010	2	1010010000101	1
	472	111010100	0000101001001	3	0010010101001	3	0100101000010	3	1000101000010	3	1010010000101	2
30	473	111010101	0000101010001	1	0010100000001	1	0100101001001	1	1000101001001	1	1010010100101	3
	474	111010110	0000101010001	2	0010100000001	2	0100101001001	2	1000101001001	2	1010010100101	1
	475	111010101	0000101010001	3	0010100000001	3	0100101001001	3	1000101001001	3	1010010100101	2
	476	111011100	0000101010101	1	0010100000101	1	0100101010001	1	1000101010001	1	1010100000001	3
	477	111011101	0000101010101	2	0010100000101	2	0100101010001	2	1000101010001	2	1010100000001	1
35	478	111011110	0000101010101	3	0010100000101	3	0100101010001	3	1000101010001	3	1010100000001	2
	479	111011111	0001000000001	1	0010100000101	1	0100101010101	1	1000101010101	1	1010100000010	3
	480	111100000	0001000000001	2	0010100000101	2	0100101010101	2	1000101010101	2	1010100000010	1
	481	111100001	0001000000001	3	0010100000101	3	0100101010101	3	1000101010101	3	1010100000010	2
	482	111100010	0001000000101	1	0010100001001	1	0101000000001	1	1001000000001	1	1010100001001	3
40	483	111100011	0001000000101	2	0010100001001	2	0101000000001	2	1001000000001	2	1010100001001	1
	484	111100100	0001000000101	3	0010100001001	3	0101000000001	3	1001000000001	3	1010100001001	2
	485	111100101	0001000000101	1	0010100001010	1	0101000000010	1	1001000000010	1	1010100001001	3
	486	111100110	0001000000101	2	0010100001010	2	0101000000010	2	1001000000010	2	1010100001001	1
	487	111100111	0001000000101	3	0010100001010	3	0101000000010	3	1001000000010	3	1010100001001	2
45	488	111101000	0001000001001	1	00101000100001	1	0101000001001	1	1001000001001	1	1010100001010	3
	489	111101001	0001000001001	2	00101000100001	2	0101000001001	2	1001000001001	2	1010100001010	1
	490	111101010	0001000001001	3	00101000100001	3	0101000001001	3	1001000001001	3	1010100001010	2
	491	111101011	0001000001010	1	00101000100101	1	0101000001001	1	1001000001001	1	1010100001010	3
	492	111101100	0001000001010	2	00101000100101	2	0101000001001	2	1001000001001	2	1010100001010	1
50	493	111101101	0001000001010	3	00101000100101	3	0101000001001	3	1001000001001	3	1010100001010	2
	494	111101110	00010000010001	1	00101000101001	1	01010000010101	1	10010000010101	1	1010100001010	3
	495	111101111	00010000010001	2	00101000101001	2	01010000010101	2	10010000010101	2	1010100001010	1
	496	111110000	00010000010001	3	00101000101001	3	01010000010101	3	10010000010101	3	1010100001010	2
	497	111110001	00010000010010	1	00101010000001	1	01010000100001	1	10010000100001	1	1010100100010	3
55	498	111110010	00010000010010	2	00101010000001	2	01010000100001	2	10010000100001	2	1010100100010	1
	499	111110011	00010000010010	3	00101010000001	3	01010000100001	3	10010000100001	3	1010100100001	2
	500	111110100	00010000010010	1	00101010000101	1	010100001000101	1	100100001000101	1	1010101000001	3
	501	111110101	00010000010010	2	00101010000101	2	010100001000101	2	100100001000101	2	1010101000001	1
	502	111110110	00010000010010	3	00101010000101	3	010100001000101	3	100100001000101	3	1010101000001	2
60	503	111110111	00010000000001	1	00101010000101	1	010100001000101	1	100100001000101	1	1010101000001	3
	504	111111000	00010000000001	2	00101010000101	2	010100001000101	2	100100001000101	2	1010101000001	1
	505	111111001	00010000000001	3	00101010000101	3	010100001000101	3	100100001000101	3	1010101000001	2
	506	111111010	00010000000101	1	00101010100001	1	010100001000001	1	100100001000001	1	1010101000001	3
	507	111111011	00010000000101	2	00101010100001	2	010100001000001	2	100100001000001	2	1010101000001	1
65	508	111111100	00010000000101	3	00101010100001	3	010100001000001	3	100100001000001	3	1010101000001	2
	509	111111101	000100000001001	1	001010101010101	1	010100001000101	1	100100001000101	1	1010101010001	3
	510	111111110	000100000001001	2	001010101010101	2	010100001000101	2	100100001000101	2	1010101010101	1
	511	111111111	000100000001001	3	001010101010101	3	010100001000101	3	100100001000101	3	1010101010101	2